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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/760,473	01/21/2004	Tamikazu Kume	001458.00040	9811

22907 7590 07/05/2005

BANNER & WITCOFF  
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WASHINGTON, DC 20001

EXAMINER
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AFREMOVA, VERA

ART UNIT	PAPER NUMBER
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1651

DATE MAILED: 07/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding:

# Office Action Summary

Application No.

10/760,473

Applicant(s)

KUME ET AL.

Examiner

Vera Afremova

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 21 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

Claims 1-4 are pending and under examination.

#### ***Claim Rejections - 35 USC § 112***

Claims 1-4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is rendered indefinite by phrase “enhancing the take of” because it is unclear as claimed what subject, feature or function is enhanced?

Claim 1 is rendered indefinite by phrase “exposing it” because it is uncertain what is exposed to electron beam.

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4 are rejected under 35 U.S.C. 102(b) as being anticipated by Takeshita et al. (“Radiation effect of low energy electron beam on plant growth”. Food Irradiation Japan, (2000), Vol. 35, No. 1-2, pages 59-63) in the light of evidence by Parniske et al. (“Plant defense response of host with determinate nodules induced by EPS-defective exoB mutants of Bradyrhizobium japonicum”. Molecular Plant-Microbe Interactions, (1994) Vol. 7, No. 5, pages 631-638).

Claims are directed to a method of enhancing plant function such as take of nitrogen fixing microorganisms wherein the method comprises exposing plants to low energy electron

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beam (EB). Some claims are further drawn to energy of applied electron beam such as 100-500 kev. Some claims are further drawn to application dose of 10 Gy to 100 kGy.

Takeshita et al. teaches plant growth enhancing effects of low energy electron beam. The method comprises identical active step of exposing plant seeds to electron beam that has energy 100-500 kev and using application dose of 10 Gy to 100 kGy (see English abstract) as required by the claimed method. The reference by Takeshita et al. teaches that irradiated soybean plant had especially significant promotion of root growth and that low energy EB induced phytoalexin activity in soybean plants (English abstract). Thus, there is a reasonable believe that the nitrogen fixing microorganisms had formed nodules on roots of irradiated soybean plants, particularly in view that phytoalexin induction or accumulation is a plant first response to microbial infection including take of nitrogen fixing microbes as evidenced by Parniske et al. (abstract).

Thus, the cited reference by Takeshita et al. anticipates the claimed invention.

Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,117,579 (Tellefson).

Clams are directed to a method of enhancing nitrogen fixation wherein the method comprises one active step of exposing plants or plant epidermis to low energy electron beam (EB).

US 5,117,579 (Tellefson) discloses method for enhancing nitrogen fixation wherein the method comprises one active step of exposing plants to low energy electron beam by moving electron emitter over filed of crops planted in earth, thereby improving supply of fixed nitrogen to plants (col. 2, lines 49-60). Thus, the cited patent by anticipates the claimed invention.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,117,579 (Tellefson) and Takeshita et al. in the light of evidence by Parniske et al.

Claims are directed to a method of enhancing plant function such as take of nitrogen fixing microorganisms wherein the method comprises exposing plants to low energy electron beam (EB). Some claims are further drawn to energy of applied electron beam such as 100-500 kev. Some claims are further drawn to application dose of 10 Gy to 100 kGy.

US 5,117,579 and Takeshita et al. disclose methods for treating plants with low energy EB wherein the intended effects are improved nitrogen fixation and promotion of plant growth. The method of US 5,117,579 encompasses treatment of grown plants that are planted in fields. The method of Takeshita et al. encompasses treatment of seeds before planting. Although the cited US 5,117,579 is silent about total dose of irradiation, Takeshita et al teaches dose and energy that are suitable for irradiating plant parts as intended for improving plant grow or plant root grow. The reference by Takeshita et al. teaches that irradiation of soybean seeds with low energy EB induces phytoalexin activity in soybean plants (English abstract) and, thereby, induces activity of nodule microbes or nitrogen fixing microbes as evidenced by Parniske et al. (abstract) since phytoalexin induction or accumulation is a plant first response to microbial infection including take of nitrogen fixing microbes.

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Therefore, it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to irradiate plants with low energy EB with a reasonable expectation of success in promoting plant grow as related to plant-microbial interaction and nitrogen fixation. Thus, the claimed invention as a whole was clearly *prima facie* obvious, especially in the absence of evidence to the contrary.

The claimed subject matter fails to patentably distinguish over the state art as represented by the cited references. Therefore, the claims are properly rejected under 35 USC § 103.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vera Afremova whose telephone number is (571) 272-0914. The examiner can normally be reached from Monday to Friday from 9.30 am to 6.00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Wityshyn can be reached at (571) 272-0926.

The fax phone number for the TC 1600 where this application or proceeding is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology center 1600, telephone number is (571) 272-1600.

Vera Afremova

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June 23, 2005



VERA AFREMOVA

PRIMARY EXAMINER